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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/578,980	12/27/95	KAMAKURA T	39-5451-0

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EXAMINER	
WILLE,D	
ART UNIT	**PAPER NUMBER**
2814	

DATE MAILED: 07/24/98

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 08/578,980	Applicant(s) Kamakura
	Examiner Douglas Wille	Group Art Unit 2814

☒ Responsive to communication(s) filed on *Jun 9, 1998* .

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-10* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-10* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____ .

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 3 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Scifres et al.

3. With respect to claim 1, Scifres et al. describe a double hetero-structure LED (see Figure 2 and column 4, lines 13 - 30) with an AlGaAs clad layer 31, an undoped InGaAs active layer 29 and a second AlGaAs clad layer 25 which uses a strain layer 27 to prevent defect migration to the active region (column 1, line 44). Scifres et al. do not specifically state the thickness of the cladding layers but all Figures show the layers as being equal.

4. With respect to claim 3, the hetero-junction employs an undoped layer between two cladding layers.

5. With respect to claim 5, Scifres et al. discuss the use of a buffer layer (column 3, line 33).

Claim Rejections - 35 USC § 103

6. Claims 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scifres et al. in view of Inoue et al.

7. With respect to claim 2, Scifres et al. show the use of a strain layer to prevent defect migration and discuss the use of a buffer layer (column 3, line 33), which is known to also limit

defect migration and also discuss adding other strain layers (column 4, line 64). Inoue et al. discuss (see abstract) the use of multiple defect regions to limit defect migration and it would have been obvious to include a second strain layer as taught by Inoue et al. to supplement the buffer region.

8. With respect to claim 8, Scifres et al. discuss the basic device structure and refer to the strain layer thickness as being approximately 10 nm (column 4, line 47). Scifres et al. also discusses the lattice mismatch as being less than or equal to 4% (column 4, line 49). Inoue et al. discusses the defect density as being in the range of 10^6 /cm^2 which corresponds to a value greater than 10^4 /cm^2. It would have been obvious to provide the Scifres et al. device with the defect density taught by Inoue et al. to improve the defect protection.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scifres et al. in view of Sugawara et al.

10. Scifres et al. describe a double hetero-structure LED. Sugawara et al. discuss a LED structure which specifically calls out a current spreading layer 15 (cover Figure) and detail the use of a buffer layer 32 (Figure 6). It would have been obvious to include the current spreading layer and the buffer layer to provide a more uniform output with improved reliability.

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scifres et al. in view of Sugawara et al.

12. Scifres et al describe a double hetero-junction LED with clad layers enclosing an undoped region and having a strain layer to prevent defect migration. Sugawara et al. provide details of a

buffer layer 32 (Figure 6), a current spreading layer 15 (cover Figure) and a reflective layer 33 (Figure 6). It would have been obvious to one skilled in the art at the time of the invention to include the current spreading layer, the buffer layer, and the reflective layers to improve device reliability and performance.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scifres et al. in view of Sugawara et al. and further in view of Inoue et al.

14. Scifres et al. describe a double hetero-junction LED with clad layers enclosing an undoped region and having a strain layer to prevent defect migration. Sugawara et al. provide details of a buffer layer 32 (Figure 6), a current spreading layer 15 (cover Figure) and a reflective layer 33 (Figure 6). Scifres et al. discusses the strain layer thickness as being approximately 10 nm (column 4, line 47). Scifres et al. also discusses the lattice mismatch as being less than or equal to 4% (column 4, line 49). Inoue et al. discusses the defect density as being in the range of 10^6 /cm^2 which corresponds to a value greater than 10^4 /cm^2.

15. Claims 5, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scifres et al. in view of Sugawara et al. and further in view of Inoue et al.

16. With respect to claim 7, Scifres et al. describe a double hetero-junction LED with clad layers enclosing an undoped region and having a strain layer to prevent defect migration. Sugawara et al. provide details of a buffer region, a current spreading region and a reflective layer. Inoue et al. describe the use of multiple defect controlling layers. It would have been obvious to modify the Scifres et al. device to include the current spreading layer, the details of the

buffer layer, the reflective layers and a second layer as taught by Sugawara et al. and Inoue et al. to prevent defect migration and enhance the device output.

17. With respect to claim 5, Sugawara et al. describe the buffer layer as helping prevent defect migration (column 9, line 53).

18. With respect to claim 10, Scifres et al. discuss the strain layer thickness as being approximately 10 nm (column 4, line 47). Scifres et al. also discuss the lattice mismatch as being less than or equal to 4% (column 4, line 49). Inoue et al. discuss the defect density as being in the range of 10^6 /cm^2 which corresponds to a value greater than 10^4 /cm^2.

Response to Arguments

19. Applicant's arguments filed 9 June 1998 have been fully considered but they are not persuasive.

20. Applicant argues that Scifres et al. do not show the claimed structure since the strain layer is in the clad layer. Note however, that the strain layer has a different composition from the clad layer and therefore qualifies as a separate layer. Applicant also states that Scifres et al. cannot be read on the claim since it doesn't agree with the specification. Nevertheless, Scifres et al. do show the claimed structure regardless of what is in the specification.

21. Applicant argues that Scifres et al. discuss the clad layers as having a typical thickness of 1 micron and quotes the Scifres et al. statement that the strain layer must be at least 0.5 microns away from the active layer to mean that the clad layer would thus be reduced to a non equal

thickness. Note however that Scifres et al. only quote a minimum thickness to prevent interference with the bandgap of the active layer and in no way imply that the clad layers have unequal thickness. In fact, Figure 2 shows the clad layers 25 and 31 as having the same thickness.

22. Applicant argues that Inoue et al. cannot be combined with Scifres et al. but the combined teaching is for multiple defect regions and since they are both part of the prior art and their teachings show benefits it is entirely proper to combine their teachings.

23. Applicant argues that Inoue et al. cannot be used to show a defect density of 10^6 /cm^2 since it is not shown in the abstract. Note however that is shown elsewhere in Inoue et al. (column 4, line 34).

24. Applicant argues that Sugawara et al. do not cure deficiencies of Scifres et al. Yet, Scifres et al. and Inoue et al. show the basic claimed structure and Sugawara et al. is relied upon to teach the use of a buffer layer on a substrate, a current spreading layer and a reflective layer which all have well documented benefits.

Conclusions

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

26. A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A. Wille whose telephone number is (703) 308-4949.

28. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose number is (703) 308-0956.

Olik Chaudhuri
Supervisory Patent Examiner
Art Unit 2814

DAW DAW

July 21, 1998